

THE HISTORY

&

DEVELOPMENT

OF THE



THE GLENN L. MARTIN COMPANY

BALTIMORE

PREPARED BY

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AS AN

INITIATION

REQUIREMENT

FOR

TAU BETA PI

UNIVERSITY OF MARYLAND

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SUMMARY

The true genesis of the Glenn L. Martin Company, long before it was dignified by legal incorporation with a "Company" title, was when a young man, aided by opportunity offered by his mother, began experimental work on airplane construction in Santa Ana, California, in 1907. His workshop was an abandoned church and his tools those available in small-town garages of that distant day, but, his labors produced a "flyable", pusher-type biplane which, in 1909, he taught himself to operate. The next three years represented a strenuous effort, against the advice of neighbors and friends, to continue in the career which fascinated him, a struggle made financially possible only by appearances in "flying circuses" and a venture into the movies in a film starring "America's Sweetheart," Mary Pickford. 1912 brought him into further international prominence when he flew from Newport Beach, California, to Catalina Island, 31 miles out in the Pacific Ocean, setting a new distance-record for over-water flying. These activities earned for him the Aero Club of America's Expert Aviation Certificate No. 2. In that same year he succeeded in his dream of becoming an airplane manufacturer. On August 16, 1912, he incorporated one of the first airplane companies in the United States and opened a factory at Los Angeles.

The next year, the company delivered its first airplane to the U. S. Army. This was not only the first in a long procession of Martin planes purchased by the Army and Navy but it was also America's first training plane and won the Curtiss Marine Trophy for covering the greatest mileage in one day.

In September, 1916, after the World War had been under way for two years, Mr. Martin participated in a merger which formed the Wright-Martin Aircraft Corporation. This association was discontinued when the activities of the new combination became concentrated on engine production. Mr. Martin again organized his own company. In September, 1917 the Glenn L. Martin Company of Ohio began operations in Cleveland and, in April, 1918, took possession of a plant of 61, 000 sq. ft. of floor space. History-making aeronautical developments followed in rapid succession.

The world-fame of the Martin name is based primarily on three epochal accomplishments.

First, in 1918, was the development of the first American twin engine bomber, a bombardment plane so superior to all contemporaries and so far in advance in design that it remained for eight years the standard of the U. S. Army.

Second, in 1933, came the sensational B-10-B Bomber which, in one jump, antiquated all other aircraft in its classification, achieving 215 miles per hour at a

time when the prevailing speed for its type was nearly 100 miles slower and when pursuit planes of 175 miles per hour were regarded as effective for defense.

Third, That same year Mr. Martin astounded the aviation world by taking a contract for a plane that "couldn't be built". Before many of the necessary accessories, including engines and propellers of adequate rating were yet in existence and before the automatic pilot had been perfected, The Glenn L. Martin Company signed a contract to produce the ocean transports now known as the "China Clipper" type, for the trans-Atlantic route, the flying boats which demonstrated to the world the practicability of trans-oceanic passenger and cargo flying when this route was changed to the Pacific ~~crossing~~.

While these three achievements are those which established the popular fame of Glenn L. Martin, the aviation world recognizes the significance of other less spectacular stepping-stones--1919, the first model mail planes; 1922, the first metal American monoplanes; 1926, the first airplane with alloy steel fuselage; 1927-8, the 3-purpose airplane for carrier use; 1929, the first dive bomber^{to} successfully ~~to~~ carry a 1,000 lb. bomb in a terminal velocity dive; and, in 1938, the Model 165, 63,000 lb. super-transport, capable of carrying 16 passengers, their baggage and a normal load of mail and express non-stop from New York to London in less than 24 hours.

Since 1929 the company's factory has been located on a 1,200 acre tract of land at Middle River, Maryland, on the Chesapeake Bay, 10 miles east of the business section of Baltimore. The property has a frontage of one and one-half miles on the main line of the Pennsylvania Railroad, affording excellent railroad transportation facilities. In addition it enjoys a frontage on tide water, penetrated by several arms of the Chesapeake Bay, where the Company's flying boats can be launched within a relatively few yards of the main Assembly Hall.

The factory site is on the northwest corner of the property contiguous to the railroad, with spur tracks in operation. The plant, is of the latest pavilion type fireproof steel and brick construction, and has been so laid out as to insure minimum operation expenses and maximum efficiency throughout. The main assembly Hall provides a clear manufacturing area of 450 feet long by 300 feet wide without columns or obstructions of any kind, where flying boats far larger than any yet constructed can be built and assembled under cover, under ideal manufacturing conditions.

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THE HISTORY AND DEVELOPMENT OF THE
MARTIN AIRPLANE COMPANY

INTRODUCTION

In describing the "History and Development of the Martin Airplane Company," a description of the events in the life of Glenn L. Martin would almost complete the subject. The story of his life is similiar to many of our national heroes who through their untiring efforts have succeeded in accomplishing what they set out to do. He had numerous failures, but through these disappointments he became hardened and strove with increased effort to overcome these difficulties.

EARLY LIFE

Glenn L. Martin was born in Macksburg, Iowa, on a bleak night in January, 1886, when the thermometer stood at 25 below zero, and there was nothing flying but snow and mortgage interest dates. Leaving Macksburg, the Martins lived for a brief while in Liberal, Kansas; but most of Glenn's boyhood was spent in Salina taking things apart. Threshing machines, separators, horseless buggies, when they put in an appearance; everything mechanical was prey for his inquisitive screw-driver.

An earnest and industrious reader, he came across magazine pieces and books about the pioneer glider work of Chanute and Lillienthal, and the flying-machine researches of Langley. This new trend of his mental interest,

and heroworshiping, first took expression in kites. Glenn filled the air around Salina with kites in such abundance, kites of such magnitude and magnificence, that Kansasⁿ drove in from all parts of Saline County to see them and to wag their heads dolefully over a bent that might easily turn into blasphemy.

Mother Martin finds that there were plain indications of the future great aircraft manufacturer in that early kitecraft. Kites were never, to Glenn, as to other boys, just a hank of string, a couple of sticks, a sheet of paper, and a ball of twine. Then, as now, he was a great one for figures. He would sit down at the kitchen table in the little home in Salina, ~~in the~~ evenings, and work for hours on an "artist's conception" of the projected kite. Satisfied presently, with the design, he would make complete working blueprints of the kite--every cross-stick, every length of string, every inch of covering--that's where a lot of Mother Martin's worn bedsheets went!--would be reduced to scaled drawings, and to cost. He knew exactly how many pennies each kite would cost him before he started to build it. In this respect Glenn Martin was the only boy in history to exactly estimate and budget his kites. From kites to gliders was a natural step for the young aeronaut, who ~~looked~~ for miles trying to find those gentle slopes which pass for hills in Kansas, so that he could get a running start for a glide into some neighbor's field.



The Martin Store at Liberal, Kansas, in the
80's.

Glenn's Father is the Hatless Man in the
Center.

Saturday Evening Post, August 14, 1937

Glenn finished two years at Kansas Wesleyan when he was nineteen--since then they have been glad to give him an honorary Sc. D. Degree--and moved to Santa Ana, California, with his parents. There he was toiling happily in a garage, surrounded by heaps of automobiles which he had taken apart, when the news came along casually and belatedly that a couple of fellows named Wright had flown. Glenn put down his wrecking-bar and walked thoughtfully home. Mother was there and as was his custom he talked over the possibilities of his accomplishing the same feat with her. She encouraged him to do the thing he thought he could do.

Glenn found an abandoned church which he could rent for twelve dollars a month. He tacked newspapers over the windows so that neighbors couldn't look in to see what he was doing and plague him by sending policemen to "get that crazy man." Nights, after he had put in a full day of work at the garage, he worked on his plane while his mother held a kerosene lamp for him. There was no other lighting available in the moldy building.

FIRST FLIGHT

The plane was finished--it was the fruit of his long list of gliders. He mounted a 14-horsepower Ford automobile motor in it, and then on a day in 1908⁵--when he was just *commas* past twenty--he wheeled it to a meadow on the farm of James Irvine, at the south end of Main Street in Santa Ana. Hundreds of people gathered, but the youngster recalls that



Church in which Martin Built His First
Airplane



Glenn Martin at the Wheel Of His First
Airplane

Saturday Evening Post August 14, 1937

as he took his seat on the front edge of the wing and secured his strap with trembling hands he could see only his mother. He flew.

THE MANUFACTURER

The garage saw him no more. Glenn Martin, airplane manufacturer, was born. For a man with such a head for figures was not one to do things on a small scale. He realized the importance of organization. "If I have any genius, any outstanding talent," he says, "it is for hiring men who know more than I do. When I speak of the engineering achievements of Martin aircraft in terms of 'we', I am not disclaiming personal credit, nor am I having an attack of generosity. I am merely telling the truth. The planes are the product of the organization. I only direct. Take for instance, a specific problem of engineering detail. I have the background of two college years, and many years of self-instruction at night. If I sit down to it and concentrate I can do that problem, and get it correct; but it will take me sixteen hours and I'll be worn out. In the plant we have one hundred engineers. Some of them are mere boys, smart as whips. I can send for any one of those boys at three-thirty in the afternoon, tell him the problem, and at five he will lay the answer on my desk and say, 'Anything else tonight, Mr. Martin?'"*

By 1913 he had in full blast in Santa Ana the largest

*Colliers, June 3, 1933 p. 48

aircraft manufacturing plant in the world. But, while the church was still their factory, poverty was the villain. Glenn, his mother and seven devoted ex-automobile mechanics would stand back and survey a little airplane, built from hand to mouth, from hour to hour: steel bargained for there, wood here, wires and linen any place. Mother Martin, like as not, had sewn on the wings.

It was their whole fortune in this world that they saw before them on the dirt floor of the tumble-down church. It would be sold--luckily. Then Glenn would go out in his own ship and give exhibitions up and down the United States throughout the summer in order to raise enough money to keep his plant going.

ODD JOBS IN THE AIR

Glenn was one of the first American pilots to win an International license of the Federation Aeronautique Internationale. He was the first aviator ever to take his mother flying; the first aviator to fly below sea level--this feat was performed at Brawley, in the ^mImperial Valley; the first to deliver merchandise by air; in 1911 he ran an aerial express service in California. He was the first to take movies in the air; a picture called "Battle in the Clouds," and he flew Mary Pickford and worked as the villain in one of her productions.

In May, 1912, two years after Bleriot flew the Channel, Glenn Martin made the longest and most daring water

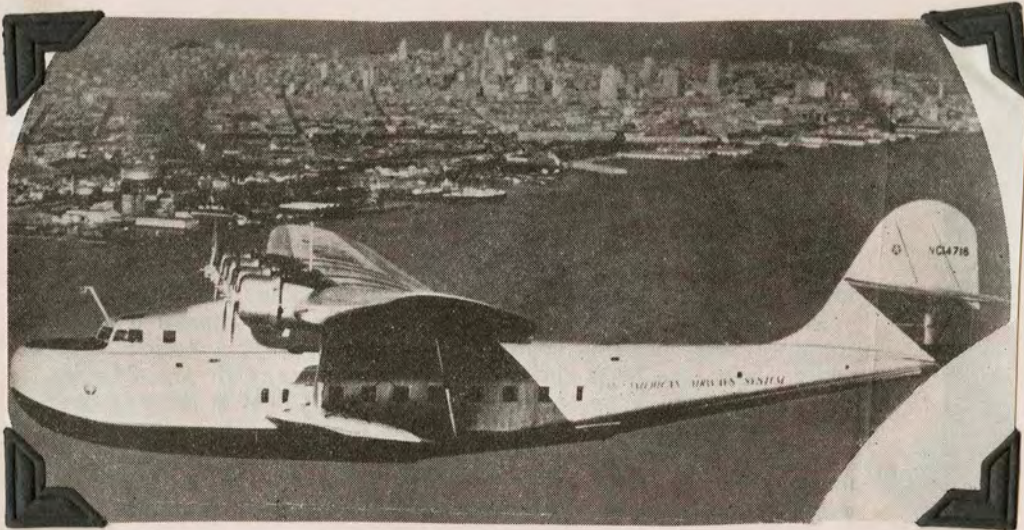


Glenn Martin Toying With The Pickford Curls In An
Early Famous Players Film," The Girl Of Yesterday
Sat. Evening Post Aug. 21, 1937

flight ever known up to that time; from the California mainland to Avalon, on Catalina Island, thirty miles out in the Pacific. In 1912 he armed himself with field glasses and performed the first aerial police work; searching for two bandits in the mountains. He did not find the bandits but he did give an interview to the papers prophesying that one day airplanes would be a commonplace and invaluable part of policework; and that air traffic would be so heavy that Federal air police would have to patrol the sky~~lanes~~ and shoot down sky-hogs and other violators.

By 1916 Glenn could earn more money on the ground. He was working on the twenty-four-plane Dutch order, building a series of ships for the Army, and filling private contracts. And in that year he entered into a new business arrangement that brought him East. Wall Street promoters organized a merger of the Wright brothers' manufacturing interests with Martin's in what was termed a \$10,000,000 enterprise. Over the protests of California newspapers, Martin accepted the vice-presidency of the new corporation and removed to New York.

Although Martin built the first Liberty-motored bomber, it saw no service in France. He was unable to get it into production until 1918 and, meanwhile, our Army had adopted the British Handley-Page. But Martin improved his bomber, a lumbering twin-motored craft with a roomy capacity for bombs and a cruising speed of 80 miles per hour, and it became standard in our Army until 1925.



Martin-Built China Clipper Outward Bound From
San ~~fr~~ Francisco Bay for Hong Kong and Way Stations

Saturday Evening Post August 14, 1937

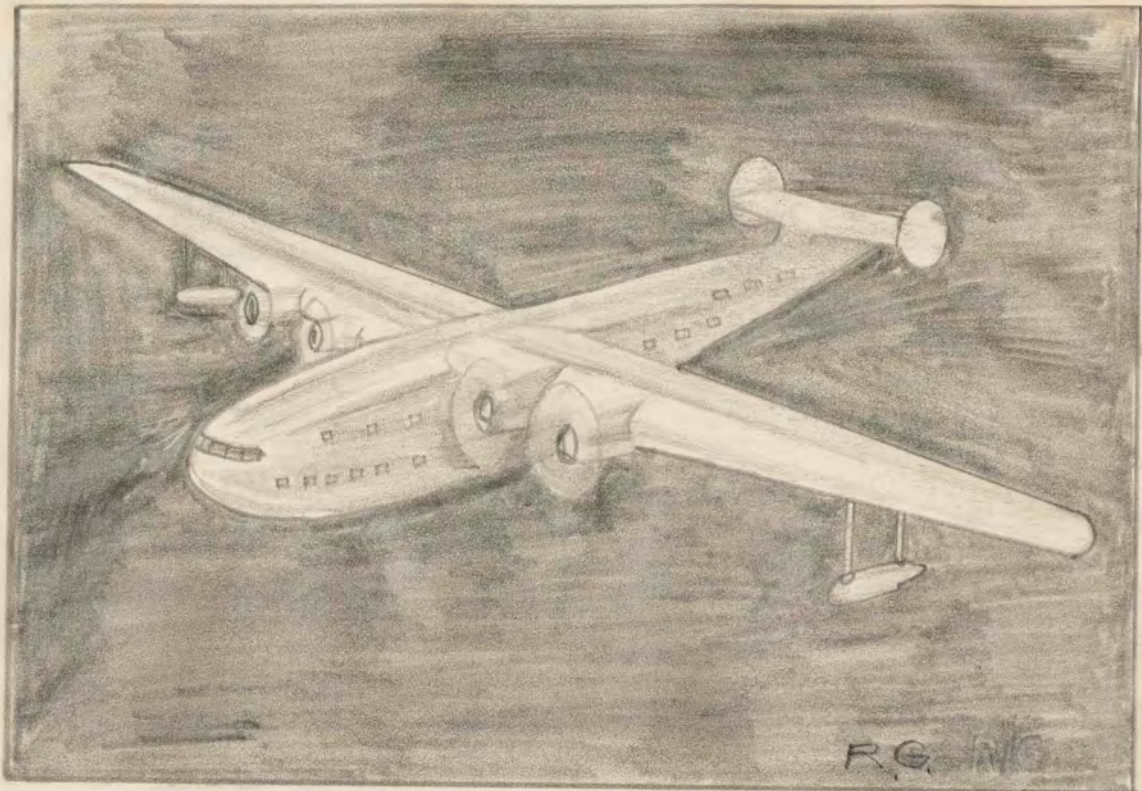
UP TO DATE ADVANCEMENTS

In 1932, he revolutionized air attack, bringing out the Model B 10-~~B~~ the famous "flying whale"--which, in one sure step, lifted the speed of heavy service aircraft by 100 miles per hour, to 225; rendered obsolete most of the light pursu~~it~~ planes in the world's armies and navies; enlarged the possibilities of swift passenger transport and earned for Martin the valued Collier trophy from the hands of President Roosevelt in 1933.

In 1933, Mr. Martin astounded the aviation world by taking a contract for a plane that "couldn't be built." Before many of the necessary accessories, including engines and propellers of adequate rating were yet in existence and before the automatic pilot had been perfected, The Glenn L. Martin Company signed a contract to produce the ocean transports now known as the "China Clipper" type for the trans-Atlantic route, the flying boats which demonstrated to the world the practicability of trans-oceanic passenger and cargo flying when this route was changed to the Pacific cru~~ssing~~ing.

In 1937 a larger flying boat similiar to the the "China Clipper" was completed. This airplane was sent to Russia for use in their extensive commercial air force. It is the largest airplane built by the Martin Co. and one of the largest planes flying today.

In 1937 Martin decided to build his "dream boat". This new ocean transport will be manned by a crew of 11



Pencil Sketch Of the Proposed Trans-Atlantic
Transport

Drawn from artists' conception of completed
airplane. Published in Baltimore Sun Dec. 11, 1937

men, and will carry its passengers on two decks in large luxurious quarters, including a game room where passengers can play table tennis and quoits.

On the lower deck will be a large salon with overstuffed chairs and a bar. Forward, beneath the pilots and radio compartment will be an observation room, where passengers will look out of large windows.

There will be a full sized kitchen, shower facilities and running water, and toilet facilities in the passengers cabins. Interior decorations are being planned carefully.

It is understood that the new flying boat is being considered for use by the American Export Airlines, a subsidiary of the Export Steamship Corporation, which has been organized to challenge the Pan-American Airways for transatlantic passenger and mail business. Below are figures that compare the new transport which will be finished in 1939 to the Russian transport.*

New Transport	Russian Transport
188'-----	wing span -----157'
118'-----	fuselege length-----91' 10"
100-----	day passengers-----46
66-----	night passengers-----26
190-----	crusing speed-----145-170
230-----	high speed-----200
16,670#-----	pay load-----7,500#
8000 mi.-----	extreme range -----5000 mi.

*Baltimore Sun 12-11-37 p. 24

NEW INOVATION³

Buzzing around high above Maryland these past few weeks has been a little airplane that may be one of the most important developments in aviations brief history. Unexciting in itself, the tiny craft may result in the development and construction of airliners so much larger than any now in existence or under way that the average mind will be unable to appreciate their dimensions.

Built by Glenn L. Martin at the Middle River Factory near Baltimore, the little ship is the world's first man-carrying, scale flying model of a full-sized flying boat. Its purpose, briefly is to determine at low cost the performance and characteristics of a projected aircraft which would cost hundreds of thousands of dollars to design, manufacture and test.

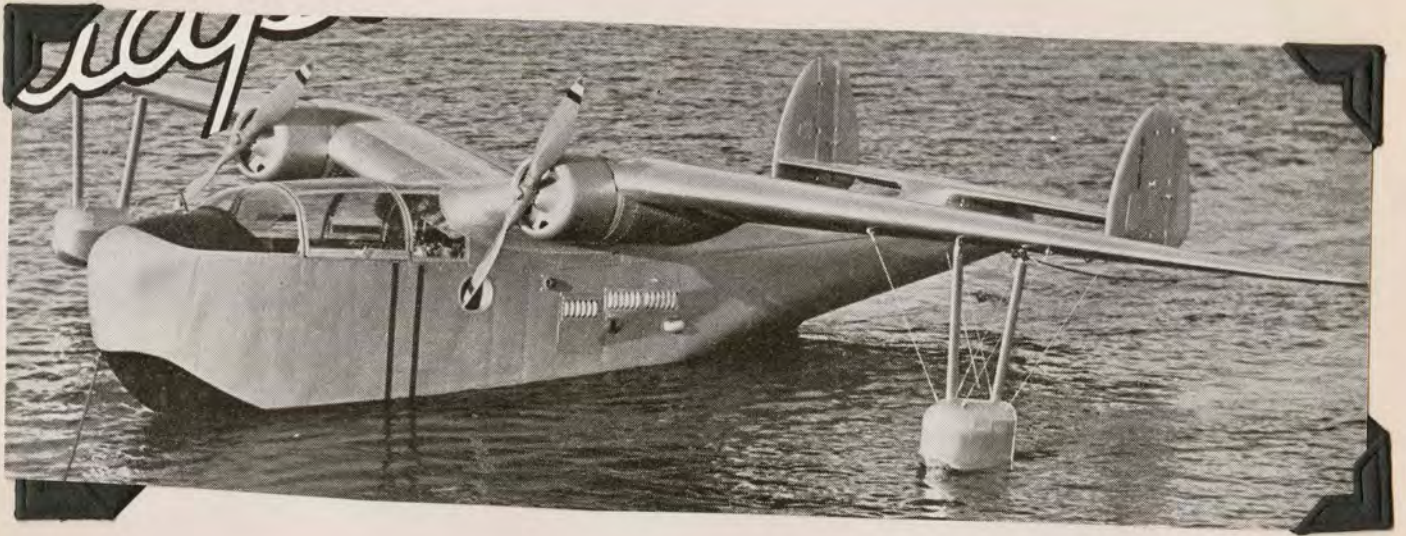
Today the only method available to them is through the use of wind tunnels and towing basins, in which a model is tested under nearly ideal conditions such as the airplane itself might encounter one day in the year. Because of the unnatural, mechanically ideal nature of the wind tunnel, errors are almost certain to creep into calculations reached through its use--errors that may result in complete failure and a consequent tremendous financial loss to the manufacturer, or, at least, necessitate costly changes in the completed airplane.

Martin hopes that the flying model built to the exact scale of the projected airplane will enable him to determine much of the data necessary for its construction,

by testing it under natural conditions to eliminate as much design error as it is humanly possible to eliminate, and enable him to make any necessary changes before construction begins.

One of the most important of the tests being conducted with the little ship is to determine its characteristics on the water. Naturally, a flying boat must handle well when it is being maneuvered on the surface, and the shape and dimensions of the hull are of the utmost importance. The Martin scale model is, as far as any one knows, the first of its type in the world. No one, to the Martin's company's knowledge, ever before has attempted this method of development.

Only when Martin has actually built a huge superliner larger than anything ever before constructed, using the scale model to help work out the characteristics and performance, and it is as successful as all his other airplanes have been, will the true value of the little experimental ship be known. Only then will anyone know definitely that the idea is the answer to the manufacturers' problems. If it is, we all may be sure that the world will see some amazing advances in the construction of big flying boats of the type which will rival the surface ocean-going craft of today; the kind that has been predicted in the Sunday "science" section, but so far not seen.



Tadpole Clipper



The novel little ship's actual size stands out
beside the recently completed Russian Clipper.

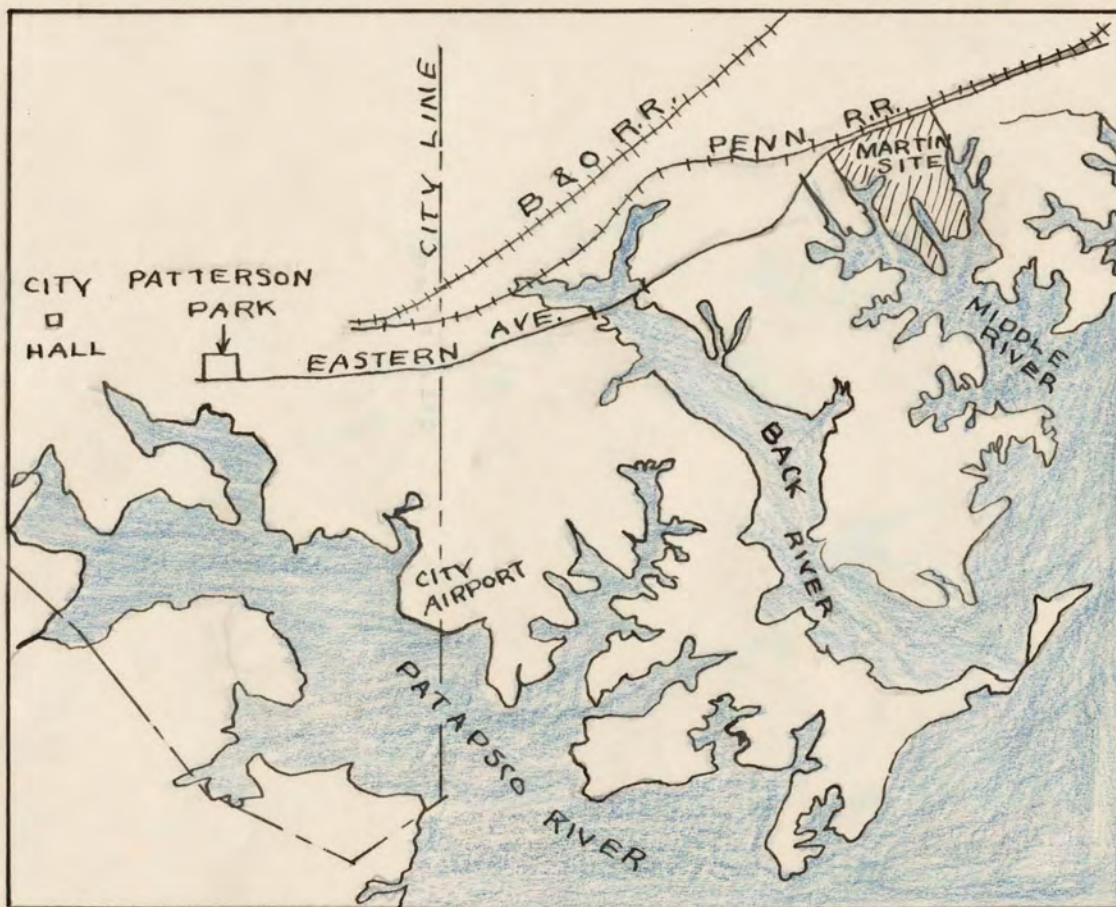
Popular Aviation March 1938

BUILDING THE FACTORY

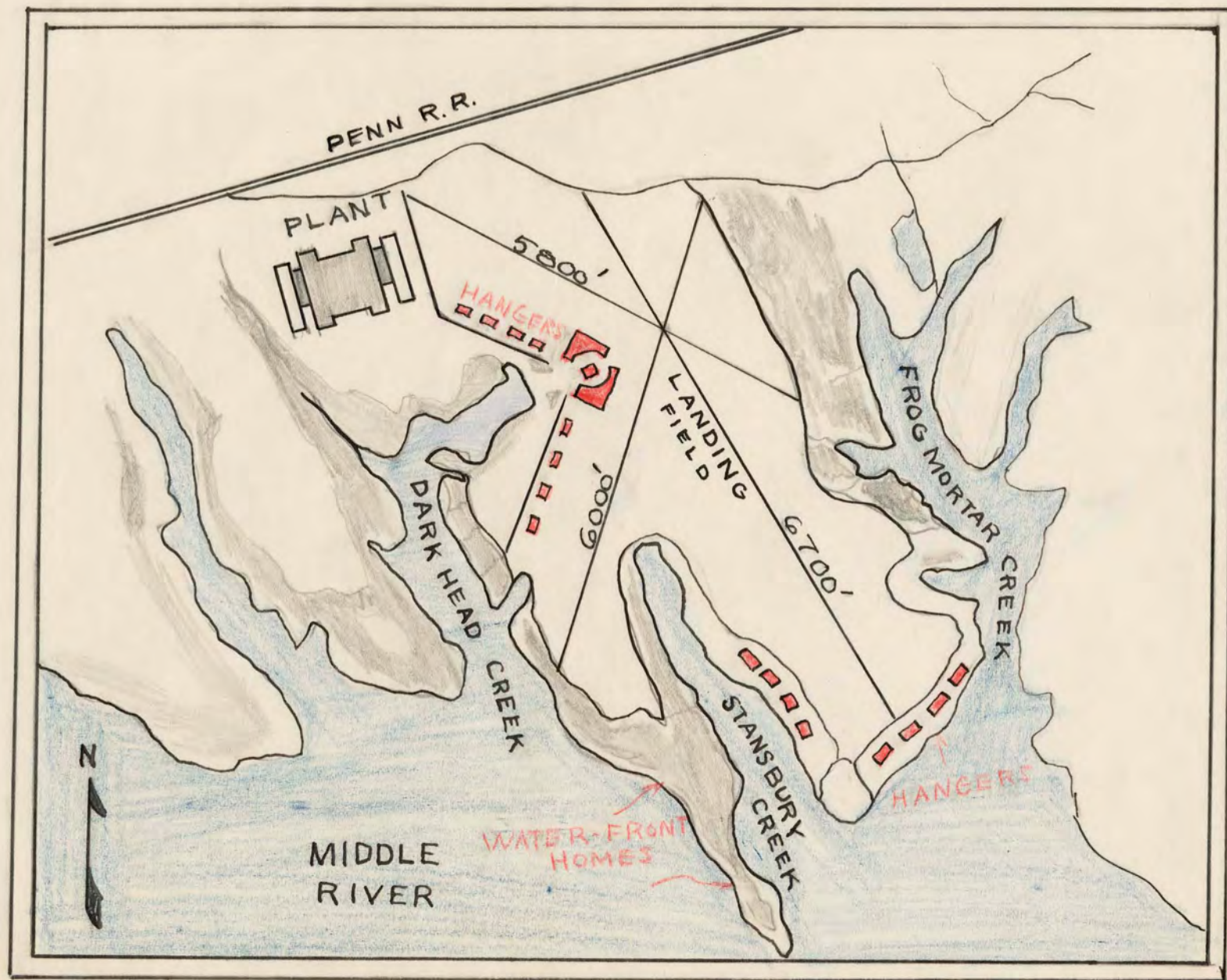
On March 15, 1929, Martin made public his intentions of establishing his airplane factory at the Middle River 10 miles from Baltimore. The following sketches show the location and general plan of his proposed site. The factory is located in a 200-acre tract north of Dark Head creek. Adjoining it is a 1,000 acre airport providing a runway of more than a mile in length in any direction. The original proposal included hangars for land and sea planes, an aviation school, hotels, restaurants and service stations, water-front residences to provide summer homes for sportsmen interested in aviation, boating, fishing and other sports also were planned. These plans were not carried out however because of the failure in the plan to make Baltimore the United States air center.

With the growing demand for transoceanic passenger planes, 15- to 20-ton army bombers, and four-engined navy flying boats, the already heavy volume of the Martin Company's business increased to a point where it was necessary to construct a new assembly plant at Baltimore. Consequently, Albert Kahn, Inc., architects of Detroit, submitted ^mcompleted designs for the structure toward the latter part of April, 1937, work on the building was started early in May, and the completed plant is now in operation. The entire project, involving a construction cost of approximately \$2,000,000, consists of a main assembly

GENERAL LOCATION OF MARTIN SITE



General location of the Martin Site.



PROPOSED SITE OF MARTIN AIRCRAFT - THE SUN 15-3-29
OBJECTS IN RED NOT BUILT BY 1938

building, a three-story engineering building, and a two-story wing in which space is provided for cafeteria, lockers and toilets. Adjoining is the office building.

The assembly building, measuring 300 ft. wide by 450 ft. long, is spacious enough to allow assembly of planes larger than any yet built. As can be seen in the following picture, even the Russian Clipper, which has a wing span of 157 ft. and an overall length of 92 ft. looks comparatively small. Twelve planes of this type could be assembled at one time in this building.

In the entire floor area of 135,000 sq. ft. there are no interior columns. The roof trusses, which span 300 ft. from column to column, are 30 ft. deep and weigh 123 tons each. Ten of these trusses, spaced 50 ft. apart, support the entire roof. Because of their dimensions, they had to be erected by methods applicable to bridge construction.

Columns supporting the ends of the trusses are 4 ft. deep, and are of the open lattice type instead of the solid web type, the 4 ft. space being used for the passage of steam, air, water and other process piping. The columns have been designed to withstand wind pressure against all sides of the building, and to achieve this result, those along one side have pin end bearings.

Height from floor to underside of the roof truss is 43 ft. 6 in., and an overhead ^{mono}nomorall system, used



Interior of the Martin assembly
building.

Aero Digest April 1938

to transport parts required in the assembly of planes, is suspended from the bottom chord of the trusses. Clear height from floor to underside of the monorail system is 40 ft. At the south end of the building there are three 100 ft. wide vertical-lift canopy type doors which can be raised simultaneously, thus providing a clear opening 300 ft. wide by 40 ft. high.

Exterior walls of the building are brick to a height of 8 ft. above floor level. Above the window sills the walls have large expanses of glazed steel sash; additional glazed sash is installed in the roof monitors so that the interior of the building is well lighted during the day.

Artificial lighting, of an intensity of 50 ft. candles on the working plane, is obtained from the installation of high-intensity mercury vapor lamps suspended at the roof truss level. Spacing of electric light outlets was designed to obtain uniformity of lighting, now recognized as being as important as intensity of lighting.

The building is heated by a Lief Lee hot-air system. Two heating chambers, 40 ft. wide by 75 ft. long, were constructed below the ground floor, one near each end of the building. Hot air ducts (or trenches) run underground distributing the heat by forced ventilation to various parts of the building. Additional under-ground trenches are used for power wiring and process piping.



Above is an artists drawing of the complete Martin Plant. The assembly room is shown on left, the engineering building in the center, and the administration and cafeteria on the right. The following pictures are snapshots of the above buildings taken at different positions.



Engineering building from the southeast corner.



Administration building on the left and the
Assembly hall as shown from southeast corner.



View taken from the Penn. R. R. with
Eastern Ave. in the foreground.



Western face of the Engineering Building
with Assembly Hall in the rear.



View of north-east corner of the Assembly
Hall with Frog Mortar Creek in the foreground.



Eastern side of Assembly Hall with Middle
River in the foreground. The concrete ramp
can be seen on the center-left.



Eastern side of Assembly Hall with
Middle River in the Foreground. Ramp
in center, Dark Head Creek to left.



A view to the south of Middle River.

CONCLUSION

In the preceeding pages the development of a great industry is presented. This thesis possible only because of the untiring efforts of one man who did not know the meaning of the word "failure". One thing has never left him in his climb to the top-- the boy from Salina who stood on a platform in London, England, and delivered the Wilbur Wright Memorial lecture of 1931 to the Royal Aeronautical Society still has the barnstormer's singular irregularity: an unconsciousness of clocks. Sometimes, when he lived in Washington, he would look up from a new sketch and see that it is on^e in the morning, and home fifty miles away. So they had to fix up an apartment for him in at the factory; it is as plain as a monastery cell, a reflection of quiet tastes. One thing you feel, back of all Glenn Martin's friendliness; an iron will.

The little church of Santa Ana could be tucked into the office safe at Baltimore. Yet it is doubtfull that Glenn Martin is any prouder of the new than of the old; he is that sort--his mind advances while his heart clings to yesterday. His is a little heavier at fifty- two than he was at twenty. He looks more like a school-teacher than an industrial leader as he sits behind his desk and looks out over his three thousand acres, but never was there a man who set his goal and strove for it as did Glenn L. Martin.

THE DEVELOPMENT OF LATER TYPES OF LOCOMOTIVES USED BY
THE BALTIMORE AND OHIO RAILROAD
COMPANY.

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SUBMITTED
BY
THOS. H. GRAHAM
FOR INITIATION
INTO
THE PHI MU FRATERNITY.

1/8/29